SHORT REPORT

Percutaneous retrieval of central venous catheter fragments

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Children with indwelling central venous catheters are at risk of embolisation of catheter fragments. Often their underlying condition means that they are poor candidates for surgical removal. We describe six children who underwent uncomplicated percutaneous transcatheter retrieval (and one who underwent percutaneous line tip repositioning), and suggest that this approach should be the treatment of choice.

As more intensive and invasive treatments become available for a wide variety of illnesses, the number of children requiring short or long term central venous access has increased. This may be achieved using indwelling vascular ports (such as a Portacath or Hickman line), or silastic long lines inserted peripherally.

Although uncommon, snapping or malpositioning of these lines does occur, and may be associated with serious consequences. Percutaneous line retrieval or repositioning avoids the need for surgery in this high risk population. A variety of percutaneous techniques have been reported by radiologists in adult patients, but very little has been published about the use of such techniques in children, especially neonates.[1] This report describes seven children who underwent percutaneous procedures performed by paediatric cardiologists, to highlight the possibility of a non-surgical approach, even in very small babies.

PATIENT DATA

A group of seven patients (three boys, four girls) is described, ranging in age from 6 weeks to 16 years. Table 1 summarises their details. All procedures were carried out in the cardiac catheter laboratory under general anaesthesia. Access was gained via the right or left femoral or internal jugular veins. Retrieval was successful in all but one case and took no longer than 40 minutes (case 6, which was unsuccessful, took 130 minutes). There were no complications.

Case 1 was born prematurely and required parenteral nutrition via a silastic long line. This was inserted in the right antecubital fossa, and the tip was shown radiographically in the subclavian vein. However, the line snapped when an attempt at removal was made, and embolised into the pulmonary artery. Percutaneous retrieval was successful using a snare fashioned from a guidewire. Case 2 underwent insertion of a Portacath via the left subclavian vein, but postoperatively the line was found in the jugular vein with its tip in the jugular bulb. It was successfully repositioned by lassooing the tip of the line and bringing it down into the right atrium.

Case 3 underwent Portacath insertion via the right subclavian vein. Subsequently the line disconnected from the port, and embolised so that one end lay in the hepatic veins, and the other in the distal left pulmonary artery. A pigtail catheter was used to pull the central portion of the line into the inferior vena cava, allowing the distal end to be snared in the right atrium, and the line successfully removed.

In cases 4, 5, and 7, the lines had snapped and become tangled in the right heart and pulmonary artery. Homemade snares were used to successfully retrieve the fragments. Case 7 had pleuritic pain and fever, typical of a pulmonary embolus, which resolved when the fragment was removed. Figure 1 shows the radiographic screening images from case 4.

In case 6, a silastic line had been inserted in the neonatal period for parenteral nutrition, and had snapped when an attempt was made to remove it. As the child was well, no further action was taken. Nine years later, the parents requested that an attempt be made at removal. However, it proved difficult to see the line on radiographic screening, and it was not possible to ensnare it. It was therefore left in place, the parents being satisfied that at least an attempt had been made to remove it.

DISCUSSION

Fracture of central venous catheters is a rare but serious complication of their use. It occurs more commonly with peripherally inserted catheters[2] than with implanted central venous access devices.[3] Embolised fragments are associated with a number of complications including pulmonary embolism, sepsis, arrhythmias, and cardiac perforation. Although some patients may be completely asymptomatic, the risk of such complications is considerable[4]; in view of this an

Table 1 Summary of patient details

Case no.	Age	Weight (kg)	Diagnosis	Venous catheter	Retrieval device
1	6 weeks (preterm)	2.4	Bronchopulmonary dysplasia	Silastic line	Snare
2	2 years	10	Cystic fibrosis	Portacath	Lassoo
3	3 years	13	Haemophilia A	Portacath	Pigtail and snare
4	4 years	13	Cystic fibrosis	Silastic line	Snare
5	5 years	17	Cystic fibrosis	Portacath	Snare
6	9 years	29	Well	Silastic line	Snare
7	16 years	57	Cystic fibrosis	Portacath	Snare

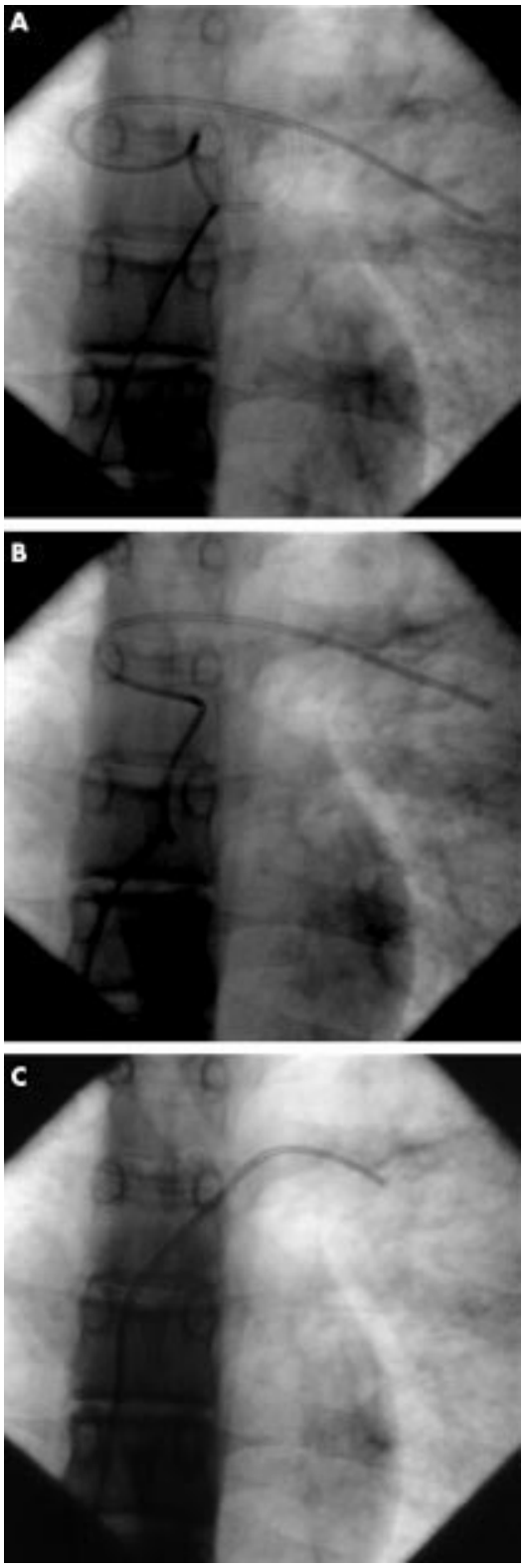

Figure 1 Radiographic screening images from case 4. (A) The proximal end of the line is caught with a snare in the main pulmonary artery. (B) Gentle traction is applied, pulling the line back through the right side of the heart. (C) Further traction pulls the line back into the inferior vena cava.

attempt should be made at removal. However, as in this series, many children have underlying conditions which make them poor candidates for surgical retrieval, for which cardiopulmonary bypass may be required. This report documents five successful cases of percutaneous retrieval of catheter fragments (and one successful line tip repositioning) performed by paediatric cardiologists, using equipment for interventional catheter procedures in children. As in the literature, there were no complications.

A number of retrieval devices are available, including snares, baskets, and forceps. However, the use of ready made equipment, particularly baskets and forceps, is limited in smaller patients as the sheath size required is too big. All the snares used in this series were "home made", fashioned from guide wires looped in a diamond shape with both ends protruding through the proximal lumen of the introducing catheter. These ends were pulled tight to secure the catheter fragment prior to traction being applied. Although the smallest patient in this series was 2.4 kg, use of a 0.014 inch wire through a 4 French catheter would allow this system to be used in neonates as small as 1.5 kg.

Although our attempt at late extraction was unsuccessful, there are reports in the literature of successful percutaneous extraction of catheter fragments as long as nine years after embolisation.[5] As the fragment was so difficult to see on radiographic screening, it seems likely that it had become endothelialised, making the risk of late complications very small.

CONCLUSION

Percutaneous extraction is a simple, quick and effective method of removing embolised catheter fragments. It can be used even in very small babies, and avoids the need for surgery in this high risk population.

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